UNIVERSITÉ DU QUÉBEC EN ABITIBI-TEMISCAMINGUE

IMPACTS DU CHANGEMENT CLIMATIQUE ET DE L'EXPLOITATION DES RESSOURCES NATURELLES SUR LE BIEN-ÊTRE DANS LES COMMUNAUTÉS AUTOCHTONES

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IMPACTS OF CLIMATE CHANGE AND NATURAL RESOURCE EXPLOITATION ON WELL-BEING IN INDIGENOUS COMMUNITIES

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ABSTRACT

Environmental changes not only affect vegetation, wildlife and water, but also people. Climate change and natural resource exploitation can affect the wellbeing of Indigenous people by causing decreased access to ecosystem services, loss of traditional knowledge and mental health problems. This research examined the impacts of environmental changes on members of four Indigenous communities of the Eastern Canadian boreal forest. A questionnaire with close-ended items on Likert scales was designed, based on the Environmental Distress Scale (EDS) and the Connor-Davidson Resilience Scale (CD-RISC-10). Individual characteristics (age, gender, parenthood and time spent on the land) and protective factors (health, quality of life, resilience, life on the land, life in the community and support from entourage) were examined for possible mitigating effects. Data were analyzed for 251 participants using linear regressions, model selection and multimodel inference. Results show that people feel impacts of environmental changes (environmental distress). Age was the only individual characteristic significantly affecting the relationship between environmental change and felt impacts, with older people feeling more impacts. Among the protective factors, quality of life had the expected effect of reducing the felt impacts of environmental changes. However, resilience showed an effect opposite to expectations: more resilient people felt more impacts. This could be due to the fact that less resilient people cease to go on the land when environmental changes exceed a given threshold, and thus only the most resilient people can testify to the impacts of those changes. Further research will be needed to test this hypothesis.

RÉSUMÉ

Les changements environnementaux affectent non seulement la végétation, les animaux et l'eau, mais aussi les humains. Les changements climatiques et l'exploitation des ressources naturelles peuvent affecter le bien-être des Autochtones en réduisant l'accès aux services écosystémiques et l'utilisation des savoirs traditionnels et en causant des problèmes de santé mentale. Ce projet de recherche a examiné les impacts des changements environnementaux sur les membres de quatre communautés autochtones dans l'est de la forêt boréale au Canada. Un questionnaire avec des questions fermées à échelles de Likert a été élaboré à partir de l'échelle de détresse environnementale (Environmental Distress Scale; EDS) et de l'échelle de résilience de Connor-Davidson (CD-RISC-10). Les effets potentiels de caractéristiques individuelles (âge, genre, parentalité et temps passé sur le territoire) et de facteurs de protection (santé, qualité de vie, résilience, vie sur le territoire, vie dans la communauté, soutien de l'entourage) ont été examinés. Les données de 251 participants ont été analysées avec des régressions linéaires, de la sélection de modèles et de l'inférence multi-modèles. Les résultats montrent que les répondants ressentent des impacts des changements environnementaux (détresse environnementale). L'âge était la seule caractéristique individuelle à affecter significativement la relation entre les changements environnementaux et les impacts ressentis; les participants plus âgés ressentaient davantage d'impacts. Parmi les facteurs de protection, la qualité de vie a eu l'effet attendu de réduire les impacts ressentis des changements environnementaux. Toutefois, la résilience a montré un effet contraire aux attentes. Les participants plus résilients ressentaient plus d'impacts. Cela pourrait être attribuable au fait que les

personnes moins résilientes cessent d'utiliser le territoire quand les changements environnementaux dépassent un certain seuil, et donc seulement les personnes plus résilientes peuvent témoigner des impacts de ces changements. Des recherches supplémentaires seront toutefois nécessaires pour tester cette hypothèse.

CHAPITRE I

INTRODUCTION

Climate change, added to an ever-increasing pressure to exploit natural resources, causes environmental changes that impact public health and challenge natural resource management. The Stern report, in 2006, noted that climate change is a potential harm to the world's economic system, as well as a determinant factor to human and other species' health (McMichael et al., 2008). Indigenous people live in close connection with the land and are thus more directly affected by environmental change (Harper et al., 2012; Rigby et al., 2011). Some of the possible effects include chronic diseases, environmental contamination and reduced access to ecosystem services. Moreover, adaptive capacity is often challenged in Indigenous communities, as access to health services can be deficient (Ford et al., 2010). This situation of inequity reduces these communities' opportunities to receive help in case of emergency (McMichael, 1993). Under increasing environmental change, the effectiveness of risk-reduction and adaptation strategies will be increasingly challenged (Furgal and Seguin, 2006).

Environmental changes have already caused major lifestyle changes in several Indigenous communities in Canada (Harper et al., 2012; Lemelin et al., 2010; Rigby et al., 2011; Willox et al., 2015). However, the interrelationships between different environmental changes such as climate change and natural resource exploitation are not well understood, especially with regards to their cumulative effects on Indigenous well-being.

People can feel distress due to environmental changes, such as pollution (Bernard et al., 2001; El-Hayek, 2007; Gracey and King, 2009; Stevenson, 1996; Xu et al., 2009), modifications of wildlife habitats (Royer and Herrmann, 2011; Stevenson, 1996) and

environmental catastrophes (Herrmann et al., 2004). Not all individuals have the same inner resources to face environmental changes; the distress caused by environmental changes depends on an individual's life history (Alves-Zervos and Shafer, 1993). The capacity of a person to bounce back after a disturbance is called resilience. It is based on the balance between wisdom, self-actualization and altruistic behaviour (Richardson, 2002).

1.1 Environmental change

Recent environmental transformations are mostly due to climate change, natural resource exploitation and land-use change. Soil erosion, higher atmospheric temperatures, changes in rainfall patterns, food contamination and species extinctions are some of the concerns raised by Indigenous communities in relation to environmental change (Bordeleau et al., 2016; Ford et al., 2010; Harper et al., 2012; IPCC, 2007b; McMichael, 1993; Nyssen et al., 2004; Rudel et al., 2005; Speldewinde et al., 2009; Stocks et al., 1998; Willox et al., 2012). Studies on climate change impacts in Nunavik and Labrador (northeastern North America) revealed increased berry production, but of lower quality; a northward migration of the black bear (*Ursus americana*); decreased abundance of caribou (*Rangifer tarandus*); increased abundance of mosquitos and other insects; a thinner sea ice layer, forming later and breaking-up earlier; and increased variability and intensity of storms (Cuerrier et al., 2015; Willox et al., 2015).

Another concern relative to environmental change is the increasing pressure for natural resource exploitation (forestry, mining, energy) (Asselin, 2011; Dana and Anderson, 2014; Klenk et al., 2013; Rodon and Lévesque, 2015; Wyatt, 2016). This is even more so when Indigenous people and other local stakeholders have few opportunities to participate in decision-making (Booth and Skelton, 2011; Klenk et al., 2013; Parlee et al., 2012; Weber et al., 2012).

1.2 Effects of environmental change on Indigenous well-being

It is common to assess people's experiences in terms of well-being, be it psychological, social or affective (Danna and Griffin, 1999). Well-being is determined by people's perception of how their lives are going (Søraker et al., 2015), with well-being considered to be achieved when people feel good about life and function well (Keyes and Annas, 2009). Therefore, well-being is associated with functioning well in a specific environment (Pluess, 2015).

Well-being measurement is often based on indicators such as income, education and life expectancy (Cooke et al., 2007). The Ryff Scale of Psychological Well-Being is used to measure an individual's spirit of self-improvement on his or her life (Ryff, 1989; Ryff and Keyes, 1995). The Positive Affect Scale indicates peoples' positive and negative affects during the past 30 days (Mroczek and Kolarz, 1998). The Scale of Social Well-being reflects people's development into their social life (Keyes, 2005). In Aboriginal contexts, well-being indicators need to take into account subsistence activities, cultural practices, land use, governance and rights (Taylor, 2008).

One consequence of environmental change on wellbeing is the probability of reducing safe food consumption, as wildlife and plants may be contaminated by pollutants (Booth and Skelton, 2011). Furthermore, natural resource extraction projects may require the relocation of people living in the exploited areas, or expose residents to environmental degradation including earth movements, noise, dust, landscape changes, and loss of wildlife habitat (Higginbotham et al., 2006).This threatens cultural preservation, as transmission of traditional knowledge and practices is hampered (Basile et al., 2017; Guyot et al., 2006). Indigenous have historically suffered much more negative consequences of natural resource extraction, compared to the few, if any benefits they obtained in return (Asselin, 2011).

Among the oft-mentioned consequences of natural resource exploitation on Indigenous people are increased distress levels, family violence, prostitution, substance abuse and

health issues (Booth and Skelton, 2011; Gibson and Klinck, 2005). Communities are frustrated, because policies do not change and remain largely detrimental to maintaining a good life on the land (Booth and Skelton, 2011). Furthermore, profound socio-ecological changes resulted from contact with missionaries, establishment of the fur trade, signing of historical treaties, and residential schools, causing transformations of subsistence activities, that led to the cultural discontinuity and a more sedentary lifestyle (Czyzewski, 2011; Lemelin et al., 2010). Hydroelectric development has caused land degradation, in turn affecting the role of tallymen within their communities (Desbiens, 2004; Hill, 2009; Parlee et al., 2012; Whiteman, 2004).

Environmental changes represent a risk that affects the capacity of Indigenous people to predict environmental patterns, which is crucial during trips on the land (Cuerrier et al., 2015; Willox et al., 2015). This threatens their health and identity (Cuerrier et al., 2015; Lemelin et al., 2010; Willox et al., 2015). For example, access to the land for cultural activities and harvesting traditional food is increasingly limited, causing an increase in chronic diseases such as respiratory illnesses, diabetes, obesity, depression, and other emotional or mental impacts associated with environmental change (Willox et al., 2015). As such, limited access to the land has a negative effect on Indigenous wellbeing.

The sustainability of knowledge-transmission systems within Indigenous communities is a source of worry for elderly people, as education is largely done on the land (Basile et al., 2017). If not adequately supported, knowledge transmission can cease, leading to a cultural discontinuity, decreased wellbeing and altered identity (Ermine et al., 2005).

1.3 Environmental distress

The damage to or loss of territories used for hunting, trapping, fishing, gathering, and transmitting traditional knowledge and languages can cause discomfort, anxiety, distress, or depression in Indigenous people (Czyzewski, 2011; Papillon, 2008). This

affects Indigenous identity and culture preservation, as well as decision-making capacity and empowerment potential (Berry, 1999; Czyzewski, 2011).

Indigenous healing considers the link between land health and people health (physical, mental, emotional) (Manitowabi and Shawande, 2011; Schiff and Moore, 2006). Each Indigenous community has its beliefs about origin of the world and how to heal it (Cardona and Rivera, 2012; Díaz et al., 2004; Kirmayer et al., 2008). Mental health is conceived holistically, as the balance and harmony among all elements of personal and collective life (Albrecht, 2005; Connor et al., 2004; Higginbotham et al., 2006).

The solastalgia concept explains how some people feel distressed following changes in their physical environment, how they feel a loss of solace, i.e., a loss of satisfaction about how their "home" is (Albrecht, 2005; Connor et al., 2004; Higginbotham et al., 2006). Feelings of loss leave them frustrated and unable to appreciate their reality leading to sadness, anxiety and depressive behaviours (Higginbotham et al., 2006).

1.4 Resilience

When experiencing disturbance (e.g., due to environmental change), not all people respond similarly. Differences are partly due to the inherent capacity of each person to "bounce back", also called resilience. One definition of resilience is accepting and meeting changes head-on while remaining positive (Lemelin et al., 2010), thus helping people increase self-efficacy in adverse situations (Richardson, 2002). In Indigenous philosophies, resilience is a question of balance between the spiritual, emotional, physical and mental dimensions of a person (Heavy and Morris, 1997). People need to recognize when and why they are out of balance, and how to restore balance. Without balance, people can experience the four stages of environmental distress (Connor et al., 2004): (1) perception of environmental changes; (2) assessment of positive or negative changes on well-being; (3) consideration of these changes as hazardous in several dimensions of one's life (solastalgia begins); (4) reaction against threats to look for

solutions and adapting to situations to try and mitigate changes (Higginbotham et al., 2006).

1.5 Gender differences

Indigenous women and men use the land differently and are thus affected in different ways by environmental changes (Basile, 2017; Desbiens, 2010; Lévesque et al., 2016), including in terms of health, education, and employment opportunities (Gibson and Klinck, 2005; Halseth, 2013). Indigenous women have not been included in studies about climate change and natural resource exploitation to the same degree as Indigenous men (Basile, 2017; Desbiens, 2010). Gender differences and inequality cross several communities and different ethnic groups (O'Shaughnessy and Krogman, 2011), where dichotomies are growing, favouring men over women (Moral et al., 2014). For example, Indigenous women can more often be victims of discrimination, home violence and sexual abuse (Gibson and Klinck, 2005; National Aboroginal Health Organization, 2008). Furthermore, it has been suggested that women are more vulnerable than men to climate change, as they do not have the same participation in policy making, and are therefore limited in expressing their needs and views (Reed et al., 2014).

Climate change often increases gender inequality. Researchers have identified four factors that make women experience socio-economic inequity based on forest activities and participation in policy making: (1) global adjustment in terms of productivity and income (2) less participation in programs or decision-making (3) sociocultural restrictions in developing potentials and (4) lack of regard for women's role in fighting climate change (Reed et al., 2014).

Research on the impacts of climate change and natural resource exploitation on distress in Indigenous populations has so far focused on women or on global populations, without deciphering the effects on men. However, sociocultural changes can make them experience anxiety and affective disorders. They can feel worry, grief, fear, anger,

loss and sadness in response to the cumulative impacts of environmental change, which can affect their quality of life (Brown et al., 2012). Therefore, consequences of environmental changes affect both genders, but differently, as traditional land uses and roles associated with men and women are different (Halseth, 2013; Natcher, 2013).

1.6 Objectives and research hypotheses

The main objective of this study was to determine the relationship between environmental changes and environmental distress in Indigenous communities in the boreal forest of eastern Canada. The specific objectives were to examine the roles of individual characteristics and protective factors. Those objectives were associated with the following hypotheses:

H1. Environmental distress increases when environmental changes increase;

H2. The relationship between environmental distress and environmental changes varies according to individual characteristics (age, gender, attendance on the land and parenthood);

H3. Environmental distress due to environmental changes is reduced by protective factors (resilience, health, quality of life, support from the entourage, life on the land and life in the community).

CHAPITRE II

MATERIAL AND METHODS

2.1 Study area

The study area is in the Eastern Canadian boreal forest, on territories of four Indigenous communities belonging to three different nations: Ouje-Bougoumou (Cree), Opitciwan (Atikamekw), Pikogan and Wahgoshig (Anishnaabeg) (Figure 2.1). These communities experience various degrees of environmental changes, both in number and intensity of stressors.

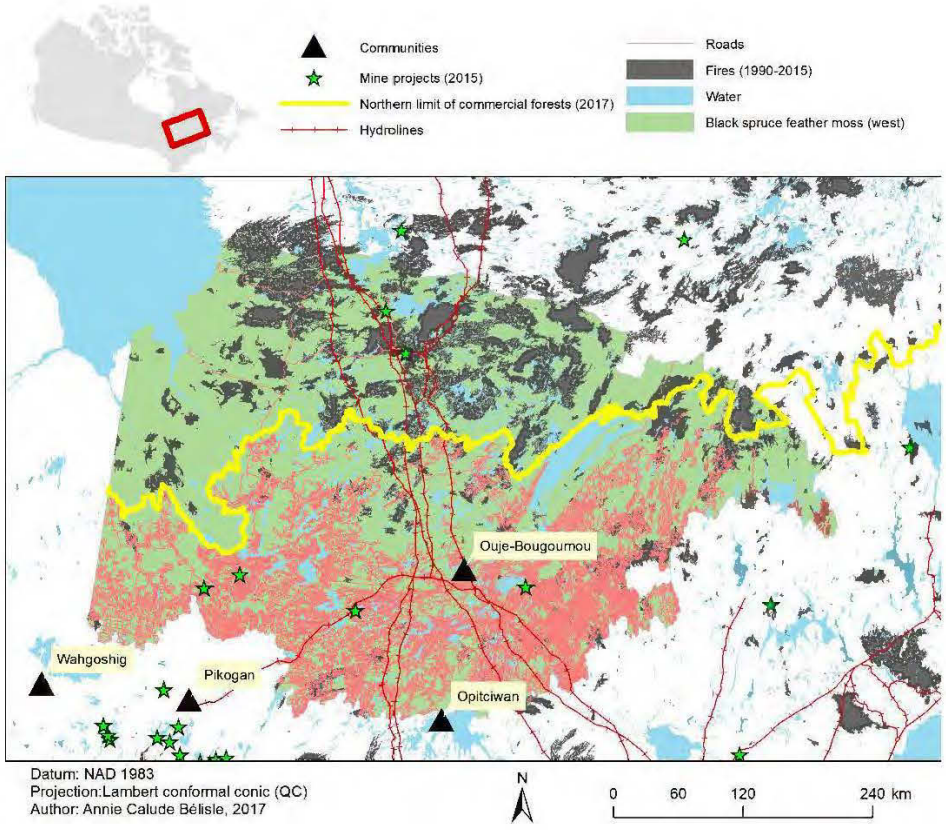

Figure 2.1 Location of the study area in boreal Quebec and Ontario.

The three nations to which the participating communities belong speak languages that are part of the Algonquian language family (Table 2.1). They share several cultural traits and all used to follow a nomadic lifestyle based on hunting, trapping, fishing and gathering conducted on traditional lands, before forced settlement in the 20th century (Samsona and Pretty, 2006). Education levels are generally low and the unemployment rate is high. The main sources of employment are public services, administration, education, health and development of community infrastructure (Ministère des Affaires autochtones et Développement du Nord Canada, 2014-2015).

Table 2.1 Population counts in 2012 for the four participating communities. Source: Affaires autochtones et Développement du nord Canada 2016 (aadnc-aandc.gc.ca/nations).

Nation	Community	Residents	Non-residents	Total members
Cree	Ouje-Bougoumou	753	67	820
Anishnaabeg	Pikogan	553	443	996
	Wahgoshig	143	160	303
Atikamekw	Opitciwan	2 254	443	2 697
	Total			**4816**

2.2 Data collection

An 82-item questionnaire was designed based on the Environmental Distress Scale (EDS) and on the 10-item Connor-Davidson Resilience Scale (CD-RISC 10) (Appendix 1). The Environmental Distress Scale (EDS) was developed to evaluate the impacts of environmental changes on human distress in rural and Indigenous communities in Australia (Higginbotham et al., 2006). It was also used in a study with the Rigolet Inuit community in Labrador, eastern Canada (Willox et al., 2012). Two of the items of the EDS were used to measure people's observations of environmental

changes and felt impacts of environmental changes such as climate change, forestry, and mining. Items were measured with a 1-5 Likert scale.

Respondents' individual characteristics were also measured to determine if they influenced the link between environmental changes (measured as observed frequency of environmental changes) and environmental distress (measured as felt impacts and feelings about changes): gender (man or woman); age group (18-35 or > 35 years old); parenthood (having children or not); and attendance on the land (never, a few times a year, a few times a month, a few times a week, always). Protective factors were also measured with slightly modified items of the EDS scale: life in the community, 14 items; life on the land, 7 items; support from the entourage, 5 items; quality of life, 1 item; health, 1 item), and resilience (10 items). The 10-item Connor-Davidson Resilience Scale (CD-RISC 10) was used to measure resilience (Connor and Davidson, 2003). It was validated for use with different ethnic groups around the world, including Indigenous people (Campbell and Stein, 2007; Connor and Davidson, 2003; Crespo et al., 2014; Goins et al., 2012). This instrument includes three factors revealing (1) personal competence and if people have high standards and tenacity (3 questions); (2) trust in one's instincts, acceptance of negative affect, and strengthening effects of stress (4 questions); (3) positive reception of change and safe relationships (3 questions). Each question was answered using a 0-4 Likert scale, thus yielding a total score range of 0 to 40. The score indicates the ability to confront changes and arduous situations (Campbell and Stein, 2007; Goins et al., 2012).

2.3 Ethical considerations

Both collective and individual consent were obtained. Each community provided approval (e.g. through a support letter, a research agreement (Assemblée des Premières Nations du Québec et du Labrador, 2014) or a resolution from the band council) and each individual participant completed a consent form, which s/he read and signed (Asselin and Basile, 2012). An ethics certificate was obtained in April 2016 from the Ethics Review Board of Université du Québec en Abitibi-Témiscamingue.

Confidentiality was guaranteed, as the names of the participants were not collected (codes were used). Further information on ethical aspects is provided in the consent form (Appendix 2). The survey was conducted between June and November 2016 to people who were 18 years old or older. The time to complete the survey averaged approximately 30 to 45 minutes per person.

Liaisons were identified within each community and helped recruiting participants who were contacted in the streets, in their homes or offices, and at public gatherings. Particular care was given to have equal numbers of men and women respondents.

2.4 Analyses

Three series of linear regressions and model selection were used to assess the relationship between perceived frequency of environmental changes and felt impacts of changes (H1), as well as the effects of individual characteristics (H2) and protective factors (H3) on this relationship (Figure 2.2). Statistical analyses were conducted with the software R 3.4.4 using the base package and the package AICcmodavg (Mazerolle, 2017). Significance of parameter influence was validated by observing the breadth and distance from zero of the confidence intervals on coefficients (based on t-values).

Application conditions were checked for all regression series with a visual examination of validation plots. Potential outliers were checked for possible errors when entering data from paper questionnaires into the electronic data file. Analyses were performed with and without outliers and results were similar and are thus presented with outliers included.

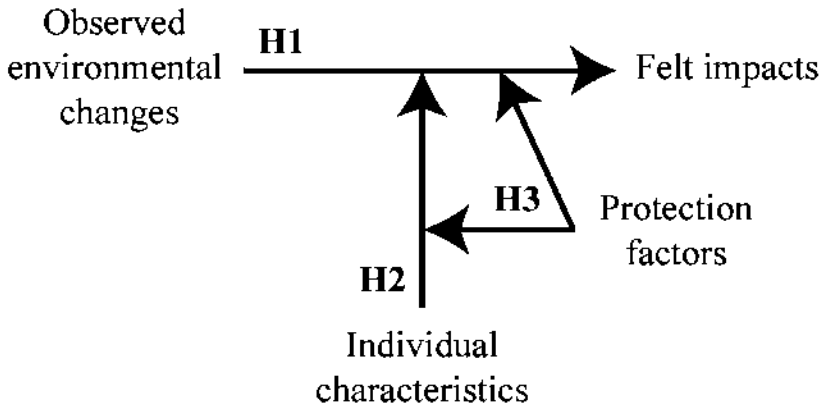

Figure 2.2 Schematic representation of the study hypotheses. H1: observed environmental changes are related to felt impacts. H2: individual characteristics influence how people feel impacts of environmental changes. H3: protective factors influence how people feel impacts of environmental changes and how individual characteristics influence felt impacts.

Reliability and internal consistency of the EDS sections (0.48-0.84) and CD-RISC 10 (0.85) were verified with Cronbach's alpha. Except for life in the community (0.48), all other variables had Cronbach's alpha values higher than 0.70, which is deemed acceptable. The effect of frequency of environmental changes on felt impacts (H1) was tested using a linear regression. The effects of individual characteristics (gender, age, attendance on the land and parenthood) on the relationship between perceived frequency of environmental changes and felt impacts were subsequently analyzed (H2). Model selection based on the Akaike information criterion (AICc) was performed to compare contributions of individual characteristics and to identify the most parsimonious combination explaining environmental distress (Burnham and Anderson, 2002). All possible combinations of individual characteristics were tested. Individual characteristics were ranked using models averaging. A variable weight was calculated by summing the weight of all models that included this variable (Burnham and Anderson, 2002). The most parsimonious model was then selected to test if protective factors (resilience, support from the entourage, life in the community, life on the land, health and quality of life) reduced the impact of perceived environmental changes (H3).

A second model selection was thus performed with felt impacts as a response variable and perceived frequency of change, selected individual characteristics and all possible combinations of protective factors as response variables (Appendix 3). The contributing factors were weighted using models averaging (similarly as for H2) (Table 2.2).

Table 2.2 Variables used to test the hypotheses.

	Hypotheses	**Variables**
H1.	Environmental distress increases when environmental changes increase.	Frequency of environmental changes + Felt impacts
H2.	The relationship between environmental changes and environmental distress varies according to individual characteristics.	H1+ Gender + Age + Attendance on the land + Parenthood
H3.	Environmental distress due to environmental changes is reduced by protective factors.	H1 + H2 + Quality of life + Resilience + Life in the community + Support from entourage + Life on the land + Health

CHAPITRE III
RESULTS

A total of 251 people completed the survey (126 women, 125 men) (Table 3.1). Highly correlated items were deleted (health and life on the land). Participants were initially assigned to one of three age groups: 18-35, 35-65, ≥66 years old. However, it was very difficult to recruit seniors and only a few (13) accepted to participate. Most mentioned they prefer interviews where they can detail and contextualize their answers, rather than answering close-ended questions. Hence, age was reclassified into only two groups for analyses: 18-35 and ≥36 years old. The majority of respondents were older than 35 years old (68.5%). Between 5 and 40% of the adults living in the communities took part in the survey.

Table 3.1 Number of respondents from each participating community, according to gender and age group.

Nation	Community	Gender	Age group			Total
			18-35	36-65	>66	
Cree	Ouje-Bougoumou	men	13	25	2	74
		women	16	16	2	
Anicinapek	Wahgoshig	men	8	12	0	38
		women	11	6	1	
	Pikogan	men	5	20	5	66
		women	6	27	3	
Atikamekw	Opitciwan	men	9	26	0	73
		women	11	27	0	
Total			79	159	13	251

Table 3.2 provides information about the variables used to test the hypotheses. Although environmental distress was measured through felt impacts and feelings about changes, only the former was used in the analyses, as results were similar with both (see Appendix 4).

Table 3.2 Variables used to test the hypotheses. Category: questionnaire sections. M = mean, SD = standard deviation. For individual characteristics, percentage of the predominant category is provided.

Category	**Section of the questionnaire**	**M**	**SD**
Environmental changes	Frequency of environmental changes	41.4	10.7
Environmental distress	Felt impacts	77.6	9.7
	Feelings about changes	38.2	6.3
Protective factors	Resilience	28.5	5.7
	Life in the community	64.3	19.2
	Life on the land	85.3	16.8
	Health	37.0	48.3
	Support from entourage	56.9	32.2
	Quality of life	43.0	49.6
Individual characteristics			**Participation (%)**
Gender	Man		49.80
Age	Older		68.53
Parenthood	Parent		77.29
Attendance on the land	A few times a year		47.00

3.1 Impacts of environmental changes

The link between frequency of observed environmental changes and felt impacts were tested using linear regression (H1). Homoscedasticity and normality of residual conditions were respected. The confidence interval of the coefficient for felt impacts excluded zero (Table 3.3), confirming the collinearity of this variable with felt impacts ($R^2 = 0.17$, $P < 0.001$). Hypothesis 1 was thus verified: the more people perceive changes on the land, the more they feel impacts (Figure 3.1). Results were the same when considering feelings about changes as a response variable (Appendix 4).

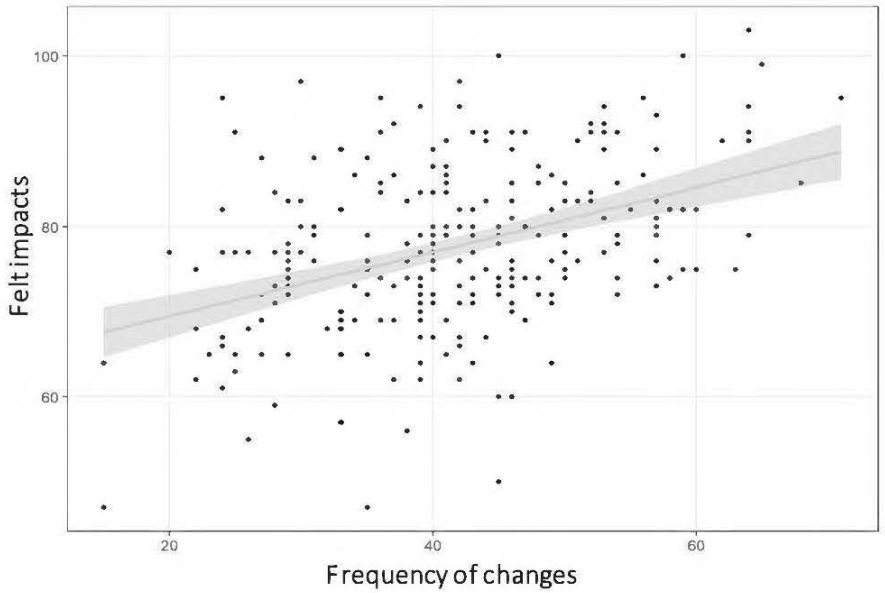

Figure 3.1 Felt impacts as a function of the frequency of environmental changes. The grey area represents the confidence interval.

Table 3.3 Specifications of the linear regression for H1.

Hypothesis	**Variable**	**Coefficients**	**Std. Error**	**Confidence interval (95%)**
H1	Frequency	0.40	0.05	(0.25 – 0.46)
Intercept		61.10		(58.42 – 67.34)
Adjusted R^2		0.16		

3.2 Effects of individual characteristics on felt impacts of environmental changes

AICc was used to assess the effects of individual characteristics on the relationship between frequency of observed environmental changes and felt impacts (H2). A total of 16 models were tested (mod0-mod15), of which four had a delta AICc ≤ 2 and were thus considered (Table 3.4). All retained models included age. Model 12 was the most parsimonious and only included age (confidence interval excluding zero; table 3.5); it was thus selected for further analyses (see below). We summed cumulative AICc weights and age had the highest weight (Table 3.6).

Table 3.4 Linear models determining the effects of individual characteristics on felt impacts of observed environmental changes. Models with delta AICc values ≤ 2 were retained (shown in bold).

Model	Variables	Delta AICc	AICc weight	Cumulative weight
12	**Feltfull~Frqfull+Age**	**0.00**	**0.19**	**0.19**
10	**Feltfull~Frqfull+Age+Attendance**	**0.70**	**0.14**	**0.33**
2	**Feltfull~Frqfull+Gender+Age**	**1.10**	**0.11**	**0.44**
11	**Feltfull~Frqfull+Age+Parenthood**	**1.51**	**0.09**	**0.53**
9	Feltfull~Frqfull+Age+Attendance+Parenthood	2.04	0.07	0.60
5	Feltfull~Frqfull+Gender+Age+Attendance	2.12	0.07	0.67
6	Feltfull~Frqfull+Gender+Age+Parenthood	2.55	0.05	0.72
14	Feltfull~Frqfull+Attendance+Parenthood	3.05	0.04	0.77
15	Feltfull~Frqfull+Parenthood	3.25	0.04	0.80
8	Feltfull~Frqfull+Gender+Age+Attendance+Parenthood	3.44	0.03	0.84
13	Feltfull~Frqfull+Attendance	3.44	0.03	0.87
0	Feltfull~Frqfull	3.44	0.03	0.91
4	Feltfull~Frqfull+Gender+Parenthood	3.95	0.03	0.93
1	Feltfull~Frqfull+Gender	4.21	0.02	0.96
7	Feltfull~Frqfull+Gender+Attendance+Parenthood	4.25	0.02	0.98
3	Feltfull~Frqfull+Gender+Attendance	4.67	0.02	1.00

Table 3.5 Specifications for H2 (model 12).

Hypothesis	Variables	Coefficients	Std. Error	Confidence intervals (95%)
H2	Frequency	0.34	0.05	(0.24 – 0.45)
	Age (≥36 years)	2.90	1.22	(0.46 – 5.30)
Intercept		61.14		(56.70 – 65.60)
Adjusted R^2		0.20		

Table 3.6 Variable weights of individual characteristics.

Individual characteristic	Weight
Age	0.75
Attendance on the land	0.42
Parenthood	0.37
Gender	0.35

Felt impacts of environmental changes varied according to age, and thus hypothesis 2 was partly verified. Older participants (≥36 years old) felt more impacts than younger participants (18–35 years old) for the same level of environmental change. However, participants in both age groups felt the same (highest) impacts for the highest level of environmental changes. None of the other individual characteristics affected felt impacts of environmental changes.

3.3 Role of protective factors in mitigating environmental distress

We compared models with AICc to assess the effects of protective factors on the relationship between frequency of observed environmental changes and felt impacts (H3). Of the 16 models we tested (mod0-mod15), three had a delta AICc ≤ 2 and were thus considered (Table 3.7). All retained models included resilience and quality of life and had a cumulative weight of 0.75.

Table 3.7 Linear models determining the effects of protective factors on felt impacts of observed environmental changes. Models with delta AICc values ≤ 2 were retained (shown in bold).

Model	Variables	Delta AICc	AICc weight	Cumulative weight
5	**Feltfull~Frqfull+Age+RESILsum+Qualfull+Commtot**	**0.00**	**0.37**	**0.37**
8	**Feltfull~Frqfull+Age+RESILsum+Qualfull+Commtot+Supptot**	**0.85**	**0.24**	**0.61**
2	**Feltfull~Frqfull+Age+RESILsum+Qualfull**	**1.94**	**0.14**	**0.75**
3	Feltfull~Frqfull+Age+RESILsum+Commtot	2.66	0.10	0.84
6	Feltfull~Frqfull+Age+RESILsum+Qualfull+Supptot	3.00	0.08	0.93
7	Feltfull~Frqfull+Age+RESILsum+Commtot+Supptot	3.96	0.05	0.98
1	Feltfull~Frqfull+Age+RESILsum	6.38	0.02	0.99
4	Feltfull~Frqfull+Age+RESILsum+Supptot	7.94	0.01	1.00
9	Feltfull~Frqfull+Age+Qualfull+Commtot+Supptot	15.36	0.00	1.00
11	Feltfull~Frqfull+Age+Qualfull+Supptot	15.71	0.00	1.00
14	Feltfull~Frqfull+Age+Commtot+Supptot	16.57	0.00	1.00
12	Feltfull~Frqfull+Age+Qualfull	17.64	0.00	1.00
10	Feltfull~Frqfull+Age+Qualfull+Commtot	17.78	0.00	1.00
13	Feltfull~Frqfull+Age+Commtot	18.09	0.00	1.00
15	Feltfull~Frqfull+Age+Supptot	18.18	0.00	1.00
0	Feltfull~Frqfull+Age	19.00	0.00	1.00

Model 5 was the most parsimonious combination of variables. Among the protective factors, only resilience and quality of life were considered, as their confidence intervals excluded zero (Table 3.8). Resilience increased felt impacts of environmental changes, whereas quality of life had the opposite effect. Resilience had the highest cumulative AICc weight (Table 3.9).

Table 3.8 Specifications for H3 (model 5).

Hypothesis	**Variables**	**Coefficients**	**Std. Error**	**Confidence intervals (95%)**
H3	Frequency	0.30	0.05	(0.20 – 0.40)
	Age (≥36 years)	2.83	1.20	(0.50 – 5.20)
	Resilience	0.44	0.10	(0.24 – 0.62)
	Quality of life	-1.36	0.63	(-2.60 – -0.12)
	Life in the community	-0.06	0.03	(-0.11 – -0.00)
Intercept		59.27		(51.80 – 66.80)
Adjusted R^2		0.22		

Table 3.9 Variable weights of protective factors.

Protective factors	Weight
Resilience	1.00
Quality of life	0.83
Life in the community	0.76
Support from entourage	0.38

CHAPITRE IV
DISCUSSION

4.1 Felt impacts of environmental changes

Hypothesis 1 was confirmed: the more people observed environmental changes, the more they felt affected. Indigenous people consider environmental changes as a hazard that not only affects the land, but also their mental health (Albrecht et al., 2007; Ford et al., 2010). Felt impacts of environmental changes were also previously documented in non-Indigenous settings (Berry et al., 2010; Berry et al., 2008; Howarth and Hoffman, 1984; McMichael et al., 2006). With increasing environmental changes due to natural resource exploitation and climate change in Canada, environmental distress of local populations is likely to increase (Campbell et al., 2009; Costello et al., 2009; Harper et al., 2011; Willox et al., 2011; Willox et al., 2012).

4.2 Influence of individual characteristics on felt impacts of environmental changes

Hypothesis 2 was partly confirmed, as older participants (≥ 36 years old) experienced more impacts than younger participants for a given level of environmental change, hence supporting the assertion that land attachment to place increases with age (Hidalgo and Hernandez, 2001). As older people spent more time on the land than younger people (Basile et al., 2017; Ermine et al., 2005), they felt more impacts, but the effect of attendance on the land was not significant (see below). Some of the oldest participants might have felt more impacts because they have responsibilities on the land (Hill, 2009; Parlee et al., 2012; Whiteman, 2004).

Because of the low participation of elderly people (≥ 66 years old) it was not possible to compare the answers of participants 36–65 years old and older than 65 years old. Older participants had difficulty understanding the abstract concepts that the questions

conveyed, and that were difficult to translate into their native languages. Furthermore, they mentioned they felt more comfortable with open questions than multiple-choice questions, as they prefer to explain and contextualize their answers. Close-ended questions therefore do not appear appropriate to work with older Indigenous people, hence qualitative methods are more appropriate to promote their participation (Holmes et al., 2002; Lavallée, 2009; Turner and Clifton, 2009).

Gender did not significantly affect the impacts felt from observed environmental changes. This could be explained by the fact that men and women share common values and cultural system that influence their perception of environmental changes in a similar way (Leonard et al., 2013; Wolf, 2011).

Parenthood also did not significantly affect the impacts felt from observed environmental changes. Parenthood was expected to play a role because cultural practices on the land are essential to future generations (Corntassel, 2008, 2012) and because the land is a privileged setting for cultural transmission (Basile et al., 2017). Maybe the lack of an effect of parenthood is due to the fact that Indigenous people tend to live in an extended family setting where everyone (parent or not) contributes to children's education (Gibson and Klinck, 2005; Grace and Trudgett, 2012; Preston et al., 2012).

Other individual characteristics not tested here might affect the impacts felt from observed environmental changes, such as family composition, employment or education (Berry et al., 2010; Kirmayer et al., 2000). In addition, people feel distressed not only in face of environmental changes, but also because of other situations with which they have to cope (Kirmayer et al., 2000).

Attendance on the land also did not significantly affect the impacts felt from observed environmental changes. While it is possible that participants with higher attendance are more exposed to environmental changes, the observed frequency of environmental change was controlled in the model. Moreover, attachment to the land might not be

directly associated with the level of attendance. There is cultural transmission between people spending more time on the land and people spending more time in the community (Corntassel, 2012; Pearce et al., 2011), and social cohesion could mean that all community members share attachment to the land as well as distress associated with changes regardless of individual attendance (Bihari and Ryan, 2012; Paton and Johnston, 2001).

4.3 Influence of protective factors in mitigating impacts of environmental changes

Hypothesis 3 was partially confirmed, as resilience and quality of life significantly influenced how people felt impacts of environmental changes. As expected, people with a higher quality of life experience fewer impacts of environmental changes (Harper et al., 2011; Kirmayer et al., 2000). However, while resilience was also expected to reduce the felt impacts of environmental change (Munang et al., 2013), the relationship was in the other direction: more resilient participants experienced more impacts of environmental changes. As resilience was positively associated with felt impacts, but also with the observed frequency of environmental changes (Appendix 5), it could be that only the most resilient people continue to go on the land when environmental changes are numerous, and thus they both observe more changes and feel more impacts. However, as they are resilient, they have adaptive capacities that help them cope with changes (Kirmayer et al., 2003). Conversely, people with low resilience could cease to go on the land when it is highly disturbed, as they are not able to handle so much change; more research is needed to test this assertion.

Quality of life can reduce the felt impacts of environmental changes. People who feel satisfied with their life are less worried about environmental changes, whereas people who feel more exposed to environmental changes are more worried about those (Ebi et al., 2006; Ford et al., 2010). Subsistence activities and cultural practices on the land influence Indigenous people's well-being and quality of life (Kirmayer et al., 2011; Taylor, 2008).

Support from the entourage did not have a protective effect on felt impacts of observed environmental changes. In three of the four participating communities, the territory is divided into family hunting grounds, and thus family members are all exposed to the same level of environmental changes and likely experience similar distress. Previous studies have shown that support from the entourage is less efficient when distress is spread throughout the family (Mirowsky and Ross, 1989; Pinto et al., 2016).

Life in the community also did not have a protective effect on felt impacts of observed environmental changes. The low internal consistency of this variable (Cronbach's alpha = 0.48) could explain why its predictive power was low. Furthermore, while life in the community turn people away from the traditional way of life (George and Preston, 1987), having a job can also provide people with the money needed to pursue traditional activities on the land (Asselin and Drainville, submitted). In addition, mobility between places make people more adaptable to different environments and situations (Lemelin et al., 2010).

CHAPITRE V
CONCLUSION

When Indigenous people in eastern Boreal Canada observe more environmental changes, they feel more impacts on their well-being. This is especially true for older people, for those who have a low quality of life and likely for those that are less resilient. Environmental distress will continue to increase in the area, as climate change will continue in the next decades (Environmental Protection Agency, 2016), and as the pressure to extract natural resources will continue to rise (Asselin, 2011).

Limitations to this study could have influenced the results. First, some factors that could possibly affect people's distress were not included, such as education, employment, access to services, or family composition. These factors could affect the felt impacts of environmental changes, either positively or negatively (Berry et al., 2010; Kirmayer et al., 2000). However, we likely took at least part of their effect into account by considering overarching variables such as quality of life, support from the entourage, and resilience. Second, due to low participation from the oldest age group (> 65 years old), a combined age class had to be used (> 36 years old) which could have masked some of the variability, as different age groups perceive the environment in different ways (Hidalgo and Hernandez, 2001; Pearce et al., 2011). Indeed, older Indigenous people are more often responsible for family hunting grounds and have a deeper connection with the land (Ermine et al., 2005; Hill, 2009; Parlee et al., 2012; Whiteman, 2004). In addition, the residential school system affected generations differently (MacDonald and Hudson, 2012). Nevertheless, the significant difference between the level of impacts felt by the younger and older age groups is consistent with expectations and with previous studies (Ermine et al., 2005).

Two possible solutions to reduce environmental distress are (1) to refuse resource development projects beyond a certain threshold of environmental change, so as not to exceed people's resilience capacity; and (2) to develop measures to increase protective factors. The first solution might prove difficult in light of the high consumption rate of natural resources worldwide requesting to constantly expand exploited areas. Nevertheless, if more work were done to identify thresholds not to be passed (Parlee et al., 2012), specific areas could be protected or managed with special measures so as to protect people's well-being. With regards to the second solution, more research would also be needed to identify measures to increase people's resilience and quality of life.

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APPENDIX 1

Questionnaire on impacts of environmental changes on well-being in Aboriginal communities of eastern Boreal Canada

General information

For each statement, indicate the one that applies to your situation

1. □ man □ woman
2. Age : □ 18–35 □ 35–65 □ 66 and over
3. Children : □ yes □ no
4. Community :
5. How often do you go to your family trapline in a typical year?
   □ never □ few times a year □ few times a month □ few times a week □ always
6. Generally, would you say your quality of life is:
   □ excellent □ really good □ good □ fair □ bad

Life in the community

For each of the following statements about life in your community, please indicate if you strongly agree (5), agree (4), neither agree nor disagree (3), disagree (2), strongly disagree (1)

	5	4	3	2	1
1. Generally, I am much attracted by the life in my community.					
2. Even if I had the opportunity to leave the community, I would still continue to live there.					
3. I feel like I belong to the community.					
4. I feel a sense of responsibility toward the members of my community.					
5. I appreciate the spirit of mutual help that prevails in my community.					
6. There are conflicts between different groups in my community.					
7. I would rather live somewhere else.					
8. My community is not a place to raise a family.					
9. People work together for the well-being of the community.					
10. Globally, I consider that there is a strong dynamism in the community.					
11. The band council defends the interests of the community.					
12. I participate to events organized in my community.					
13. Governments invest sufficiently in the community.					
14. Companies invest sufficiently in the community.					

Support from the entourage

For each of the following statements about the support you receive from people near you, please indicate how often you have access to such support when you need it: always (5), often (4), sometimes (3), rarely (2), never (1)

	5	4	3	2	1
1. A person who advises you concerning an important decision you must take.					
2. A person to whom you can confide and talk about personal and intimate things.					
3. A person to tell you that you have good ideas, that you are taking good decisions.					
4. A person with whom you can make activities to change your mind, have a good time.					
5. A person that can provide you with traditional food or other products from the land.					

Frequency of environmental change

For each of the following statements about environmental impacts, please indicate their frequency of occurrence on your family trapline: almost always (5), often (4), sometimes (3), rarely (2), never (1)

	5	4	3	2	1
1. Forest harvesting					
2. Mining exploration (claim lines, etc)					
3. Mining exploitation (mine)					
4. Dams, reservoirs, hydroelectric facilities (plants, substations, transport lines)					
5. Wind turbines					
6. Roads (usable by car)					
7. Non-Aboriginal hunting camps					
8. Air pollution from industrial activities					
9. Noise from industrial activities					
10. Vibrations from industrial activities					
11. Soil pollution from industrial activities					
12. Water pollution from industrial activities					
13. Forest fires					
14. Insects outbreaks					
15. Unpredictable weather (temperature, rainfall, storms)					

Felt impacts

For each of the following statements about possible environmental impacts, please indicate if you strongly agree (5), agree (4), neither agree nor disagree (3), disagree (2), strongly disagree (1)

	5	4	3	2	1
1. Economic benefits of industrial development (e.g.,jobs) are more important than any concerns I might have about the local environment.					
2. Economic benefits of industrial development are equitably shared between community members.					
3. I am unable to enjoy life as much as I would like because of local environmental changes.					
4. I feel positive about local environmental changes.					
5. Claims about sickness being caused by environmental pollution are exaggerated.					
6. My community is divided by disagreements about environmental issues.					
7. People I know have become physically ill because of pollution in the local environment.					
8. I am upset at the destruction of cultural sites due to industrial development.					
9. I am disturbed that decisions about development activity here do not give higher priority to long-term land use for future generations.					
10. My community receives its fair share of benefits from industrial development on the land.					

11. Industry funding of community projects is genuinely useful to my community.					
12. My ability to make a living has been negatively affected by environmental problems.					
13. I feel angry about degradation of my family trapline.					
14. I am worried about risks to human health from pollution.					
15. I am concerned that future generations will not be able to enjoy the natural environment.					
16. I am frustrated because I can't influence decisions about the development of the land.					
17. I am concerned environmental problems will cause illness to myself or my family.					
18. I am satisfied with the governments' efforts to monitor environmental impacts from industrial development.					
19. People in this area feel frustrated because the band council and community employees have limited power to influence environmental decisions.					
20. People I know have given up trying to preserve the environment because they feel powerless.					
21. The overall impact of industrial development on the land is depressing.					
22. People I know have become disillusioned trying to negotiate their rights in relation to the impact of industrial development.					

Feelings about environmental changes

For each of the following statements, please indicate if you strongly agree (5), agree (4), neither agree nor disagree (3), disagree (2), strongly disagree (1)

	5	4	3	2	1
1. My sense of belonging to the land has been negatively affected by environmental changes.					
2. I am sad that familiar animals, plants and fishes are disappearing from the land.					
3. I am worried that aspects of the land that I value are being lost.					
4. I miss having the sense of peace and quietness I once enjoyed on the land.					
5. I am ashamed of the way the land looks now.					
6. A land-based lifestyle is threatened by environmental changes.					
7. The peculiarities of the land that make it unique are disappearing.					
8. I am saddened when I look at degraded landscapes.					
9. The thought that my family could no longer use the land upsets me.					
10. I feel positive about the restoration of the land.					

Resilience (CD-RISC-10)

Please indicate how much you agree with the following statements as they apply to you over the last ***month****. If a particular situation has not occurred recently, answer according to how you think you would have felt. True nearly all the time (4), often true (3), sometimes true (2), rarely true (1), not true at all (0)*

	4	3	2	1	0
1. I am able to adapt when changes occur.					
2. I can deal with whatever comes my way.					
3. I try to see the humorous side of things when I am faced with problems					
4. Having to cope with stress can make me stronger.					
5. I tend to bounce back after illness, injury, or other hardships.					
6. I believe I can achieve my goals, even if there are obstacles.					
7. Under pressure, I stay focused and think clearly.					
8. I am not easily discouraged by failure.					
9. I think of myself as a strong person when dealing with life's challenges and difficulties.					
10. I am able to handle unpleasant or painful feelings like sadness, fear, and anger.					

Comments:

APPENDIX 2

Consent form

TITLE OF THE RESEARCH PROJECT: Cumulative impacts of climate change and natural resource exploitation on quality of life in Aboriginal communities of the boreal forest.

NAME AND AFFILIATION OF THE RESEACHERS: Laura Fuentes, MSc students in social sciences, UQAT; **Hugo Asselin** and **Oscar Labra**, professors at the department of human and social development sciences, UQAT.

SPONSOR OR SOURCE OF FUNDING: Social Sciences and Humanities Research Council of Canada

DURATION OF THE PROJECT: 2 years.

ETHICS CERTIFICATE ISSUED BY THE UQAT ETHICS REVIEW BOARD : April 20, 2016

We would like you to participate to a research project that involves answering a questionnaire about your perception of environmental changes and their impacts on you and your community. Before agreeing to participate to this research project, please take the time to understand and carefully consider the following information.

This consent form explains the purpose of this study, the procedures, the advantages, the disadvantages and the risks, as well as the people to communicate with if you have any questions concerning the progress of the research or your rights as a participant. Therefore, we invite you to address all of your questions to the researchers of this project.

This research follows the research principles prescribed in the First Nations of Québec and Labrador Research Protocol.

PURPOSE OF THE RESEARCH:

The purpose of the research is to evaluate the cumulative impacts of climate change and natural resource exploitation on quality of life in Anishnaabe, Cree, and Atikamekw communities of the boreal forest. Impacts on communities will be evaluated, as well as impacts on individuals, putting the emphasis on the comparison between men and women.

YOUR PARTICIPATION TO THE RESEARCH:

Your participation to this project involves answering a questionnaire about your relationship with your land and your community, environmental changes and your reactions and those from your community while facing environmental changes. You will need approximatively 30 to 45 minutes to answer the questionnaire.

ADVANTAGES ARISING FROM YOUR PARTICIPATION:

Your participation to this project will contribute, among others, to the understanding and acknowledgment of environmental changes in your community, and will therefore be useful to develop decision-making tools concerning land governance and natural resource management.

RISKS AND DISADVANTAGES ARISING FROM YOUR PARTICIPATION:

You are not taking any risks by participating to this research. The only drawback will be the time needed to answer the questions.

COMMITMENTS AND MEASURES TO ENSURE CONFIDENTIALITY:

To ensure the full confidentiality of the information you will share with us, the following measures will be taken :

- No personal information allowing to identify you will be shared.
- Members of the research team engage to respect their confidentiality.
- Your first and last names will be replaced by codes during data processing.
- Files will be kept in computers protected by passwords.
- Printed questionnaires will be kept in a locked file in Hugo Asselin's office.
- Data will be kept five years after the final publication of the research. Thereafter, the coded data will be transferred to the participating communities.

COMPENSATION:

A symbolic compensation (a pen with UQAT's logo) will be given to you to thank you for participating to the research.

COMMERCIALIZATION OF RESULTS:

Results from this research will not be commercialized in any way. The researchers declare no conflict of interests.

DISSEMINATION OF RESULTS:

- Results of the research will be shared with the band council of your community before dissemination.
- Results will be orally presented to your community and a written outline in clear and understandable language will also be provided.
- Results will be published in two masters thesis and will be disseminated into scientific articles and oral presentations in scientific conferences.

RESPONSIBILITY CLAUSE:

By agreeing to be part of this research, you neither renounce to any of your rights, nor do you free the researchers and the institutions involved of their legal and professional obligations toward you.

THE PARTICIPATION IN RESEARCH IS VOLUNTARY:

Your participation is voluntary. You have the right to refuse to participate and you can withdraw from the study at any times without prejudice and justification. In such a case, you must inform the researchers so the data concerning your personal information will be deleted as far as they can be tracked down.

For additional information concerning your rights as a participant, you can contact:

UQAT's Ethics Review Board

Vice-rectorate, teaching, research and creation

445, boul. de l'Université, Office B-309, Rouyn-Noranda (Qc) J9X 5E4

1-877-870-8728 # 2252 | cer@uqat.ca

Consent:

I, undersigned, voluntarily accept to participate to the project « Cumulative impacts of climate change and natural resource exploitation on quality of life in Aboriginal communities of the boreal forest ».

_____

Name of the participant

_____ _____

Participant's signature Date

This consent was obtained by:

_____

Name of the researcher or research assistant

_____ _____

Researcher's signature Date

Questions:

If you have other questions during project duration, you can contact:

Maël Casu, 1-877-870-8728, ext. 2639, Mael.Casu@uqat.ca

Laura Fuentes, 1-877-870-8728, ext. 4377, Laura.FuentesSerna@uqat.ca

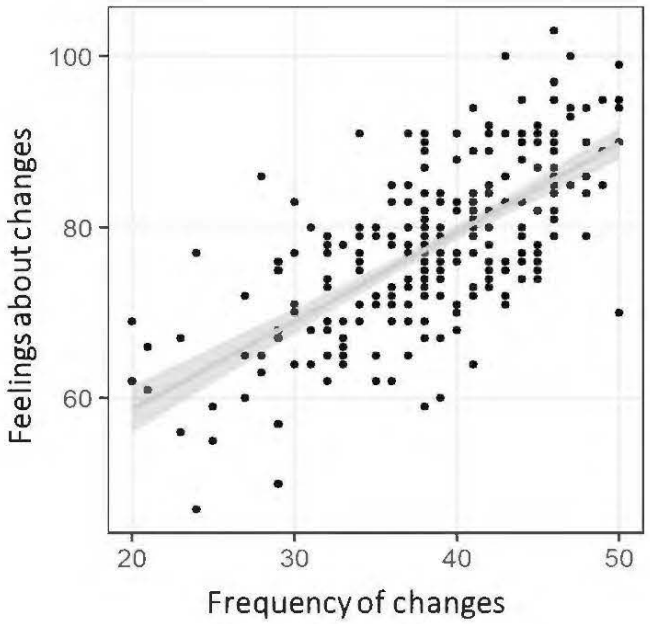
Hugo Asselin, 1-877-870-8728, ext. 2621, Hugo.Asselin@uqat.ca

Please keep a copy of this form for your files.

APPENDIX 3

Model	Variables	Delta AICc	AICc weight	Cumulative weight
5	**Feltfull~Frqfull+Age+RESILsum+Qualfull+Commtot**	**0.00**	**0.37**	**0.37**
8	**Feltfull~Frqfull+Age+RESILsum+Qualfull+Commtot+Supptot**	**0.85**	**0.24**	**0.61**
2	**Feltfull~Frqfull+Age+RESILsum+Qualfull**	**1.94**	**0.14**	**0.75**
3	Feltfull~Frqfull+Age+RESILsum+Commtot	2.66	0.10	0.84
6	Feltfull~Frqfull+Age+RESILsum+Qualfull+Supptot	3.00	0.08	0.93
7	Feltfull~Frqfull+Age+RESILsum+Commtot+Supptot	3.96	0.05	0.98
1	Feltfull~Frqfull+Age+RESILsum	6.38	0.02	0.99
4	Feltfull~Frqfull+Age+RESILsum+Supptot	7.94	0.01	1.00
9	Feltfull~Frqfull+Age+Qualfull+Commtot+Supptot	15.36	0.00	1.00
11	Feltfull~Frqfull+Age+Qualfull+Supptot	15.71	0.00	1.00
14	Feltfull~Frqfull+Age+Commtot+Supptot	16.57	0.00	1.00
12	Feltfull~Frqfull+Age+Qualfull	17.64	0.00	1.00
10	Feltfull~Frqfull+Age+Qualfull+Commtot	17.78	0.00	1.00
13	Feltfull~Frqfull+Age+Commtot	18.09	0.00	1.00
15	Feltfull~Frqfull+Age+Supptot	18.18	0.00	1.00
0	Feltfull~Frqfull+Age	19.00	0.00	1.00

APPENDIX 4


100
80
60
Feelings about changes
20
30
40
50
Frequency of changes

APPENDIX 5